REMARKS

Applicants have amended their claims in order to further clarify the definition of the present invention. Specifically, Applicants have canceled claims 1-7, 18-26 and 28-65 without prejudice or disclaimer, in order to simplify issues remaining in connection with the above-identified application. Moreover, Applicants have amended each of claims 8 and 27 to recite that the semiconductor sample processed has a laminate including at least two "adjacent" films (layers) of at least two different metals (materials) of different ionization tendencies, whereby corrosion could be generated and accelerated due to battery action between films (layers) of the laminate, including the at least two adjacent film (layers); and to recite that the semiconductor sample having the laminate is transferred from the first location to the second location through an atmosphere having a pressure reduced from atmospheric pressure.

Moreover, Applicants have added new claim 66 to the application. Claim 66, dependent on claim 27, defines the different materials, of different ionization tendencies; in connection with claim 66, note, for example, claim 16.

The contention by the Examiner that the request for change in inventorship will be granted **"when a signed copy is submitted by the applicant"**, is noted. This does not indicate just what is required (that is, a signed copy of what?). Within the context of Item 1 on page 2 of the Office Action mailed February 14, 2002; it would appear that a signed copy of a new Declaration by the actual inventors is required. If this requirement is maintained, it is respectfully requested that the Examiner clearly set forth just what is required. See 35 USC 132.

In any event, any requirement for a signed copy of a new Declaration is

respectfully traversed. As contended by Applicants in the parent application of the above-identified application, application Serial No. 08/470,443, filed June 6, 1995, it is respectfully submitted that 37 CFR 1.48(b) does not require a new Declaration. While the Examiner has indicated that "other sections of the code" require a newly signed Declaration, the Examiner has not indicated the "other sections" of the code requiring such new Declaration. Failure to specifically set forth a basis for this requirement of a new Declaration is clearly improper. See 35 USC 132.

In the Advisory Action mailed March 7, 1997, in prior application Serial No. 08/470,443, filed June 6, 1995 (of which the above-identified application is a Continuation application under 35 USC 120), the Examiner granted the change of inventorship and did not require a new Declaration. See the "Note" on the first page of this Advisory Action mailed March 7, 1997, in No. 08/470,443, filed June 6, 1995, a copy of which Advisory Action is enclosed herewith. Similarly herein, it is respectfully submitted that Applicants need not submit a new Declaration.

The objection to various claims under 37 CFR 1.75(c), set forth in Item 2 on page 2 of the Office Action mailed February 14, 2002, is noted. It is respectfully submitted that this objection is now moot, in view of canceling of claims in the present application.

Applicants respectfully submit that all of the claims now presented for consideration by the Examiner patentably distinguish over the teachings of the references as applied by the Examiner in rejecting claims in the Office Action mailed February 14, 2002, that is, the teachings of the U.S. patents to Peterman, et al., No. 4,855,252, to Moe, et al., No. 4,722,355, and to Noguchi, et al., No. 4,487,678, European Patent Application No. 247,603 (Nakamura), and Elliott, Integrated Circuit

Fabrication Technology, pages 56-59, 256, 257, 268, 269, and 272-275, under the provisions of 35 USC 103.

It is respectfully submitted that these references as applied by the Examiner would have neither taught nor would have suggested such a method of processing a semiconductor sample as in the present claims, the sample having a laminate including at least two adjacent films (layers) of at least two different metals (materials) of different ionization tendencies, whereby corrosion could be generated and accelerated due to battery action between layers of the laminate, including the at least two adjacent films (layers), and wherein the method includes, after etching by means of a first plasma whereby residual corrosive compounds are left on the sample, ashing or treating by means of a second plasma to remove resist and residual corrosive compounds formed in the etching, contacting a surface of the etched and ashed (treated) sample with at least one liquid which removes residual corrosive compounds and/or passivates the etched and ashed surface (see claim 8), or removes residual corrosive compounds not removed in the treatment with the second plasma (see claim 27), and drying after contact with the at least one liquid, with the sample having the laminate being transferred from the first location where etching is performed to the second location where the second plasma is applied through an atmosphere having a pressure reduced from atmospheric pressure. Note each of claims 8 and 27.

As for claims 8 and 27, note, respectively, claims 22 and 30 of U.S. Patent No.5,868,854, which claims 22 and 30 were granted notwithstanding citation of each of the references applied by the Examiner in the Office Action mailed February 14, 2002 in the present application.

Furthermore, these applied references would have neither disclosed nor would have suggested such method of processing a semiconductor sample as in the present claims, including the exacerbated problem of corrosion arising where the different metals (materials) of the adjacent films (layers) of the laminate are selected from the group consisting of Al, Cu and refractory metals, alloys of at least one of Al, Cu and refractory metals and also containing silicon, silicides of refractory metals, TiN and TiW. Note each of claims 16 and 66.

In addition, it is respectfully submitted that these applied references would have neither taught nor would have suggested such method as in the present claims, including the ashing/treating and liquid contact, and drying, with transfer between first and second locations respectively of the etching and of the ashing/treating, as discussed previously, and wherein the surface of the semiconductor sample is treated with the at least one liquid to remove residual corrosive compounds which are not removed by the treatment with the second plasma. See claim 27.

Moreover, it is respectfully submitted that the teachings of these applied references would have neither disclosed nor would have suggested such a method of processing a semiconductor sample as in the remaining, dependent claims, having features as discussed previously, and further including (but not limited to) wherein the atmospheres in which the various steps take place are those set forth in claims 9 and 12-14; and/or wherein the drying uses an inert gas or introduces a dry gas to the sample (see claims 10 and 15); and/or wherein the ashing/treating using the second plasma is performed using oxygen in the second gas in which the second plasma is formed (see claim 11); and/or wherein in the ashing step

(treatment by the second plasma) the whole of the resist mask is removed (see claim 17).

The present invention is directed to a method of processing (which includes an etching processing) a semiconductor sample having a laminate including adjacent films of different materials of different ionization tendencies. This structure is especially open to corrosion due to battery action between films of the laminate, including the adjacent films of different materials. In particular, the present invention is directed to such method, wherein corrosion of the etched semiconductor sample can be avoided. The present invention is particularly suitable for processing a semiconductor sample in the manufacture of semiconductor devices, which processing utilizes a resist mask during the etching, and forming a pattern from, for example, the laminate, overlying a semiconductor substrate.

During such processing, the resist mask can act not only to selectively etch the laminate, but also acts to provide a protective film on sidewalls of the etched laminate during the etching. During etching, where the films of the laminate are of different metals (for example, a TiN upper film and an aluminum alloy lower film), the etching speeds are different and a notch or undercut would occur at the aluminum alloy lower film, which has a higher etching speed than the TiN upper film. However, when using a resist, carbon and hydrogen of the resist are sputtered during the etching and adhere to the sidewalls of the etched laminate, for example, thereby providing a protective film on the sidewalls, preventing the notch or undercut. This protective film, made of components of the resist film, is removed during removal of the resist. However, during formation of this protective film, residual corrosive

components (for example, chlorides of aluminum, titanium, etc.) are incorporated in the protective film, which is especially detrimental in connection with electrolytic corrosion (discussed further infra).

A corrosion-proofing technique after etching is disclosed, for example, in U.S. Patent No. 4,487,678. This technique subjects a resist film, after plasma etching a layer using the resist as a mask, to removal in a second plasma processing chamber, connected to the etching chamber. The second plasma treatment not only removes the resist film, but also removes chlorine compounds which are corrosive components remaining in the resist films or on the etched surface.

It is also known to heat the sample, after etching, to at least 200°C, in order to promote evaporation of chlorides that are residual corrosive compounds, for avoiding corrosion.

However, Applicants have found that the above-described corrosion-proofing techniques after etching in a plasma are not sufficient for samples having laminated layers of materials of different ionization tendencies, adjacent each other, overlying a substrate, especially where a resist mask is provided over the laminate during the etching. That is, the foregoing corrosion-proofing techniques fail to provide sufficient corrosion-proofing effect after etching a sample having a laminate including at least two adjacent films of at least two different metals of different ionization tendencies, such as a laminate wiring structure. See, for example, page 2, lines 11-18, of Applicants' specification. This insufficiency is particularly a problem at present, in view of the materials utilized as a wiring film in integrated circuit devices, and also in view of the increased density (decreased size, including decreased size of the

wiring) of integrated circuit devices. As described in the paragraph bridging pages 2 and 3 of Applicants' specification, even if corrosive materials generated by etching are removed by utilizing a plasma at a high temperature of 200°C, corrosion occurs due to the effect of moisture on remaining corrosive compounds, within some minutes or several hours after the sample is withdrawn into the atmosphere.

That is, Applicants have found that in etching the laminate using a resist mask, as in the presently claimed invention, a protective film (discussed previously) is formed on sidewalls of the etched laminate structure, and residual corrosive compounds remain in this protective film. This protective film is made of components of the resist; and by carrying out plasma processing for resist removal, residual corrosive compounds in the protective film are exposed to the etched surface, and residual corrosive compounds not removed in the plasma processing for resist removal can cause corrosion of the etched structure.

In addition, a further corrosion problem has been uncovered by Applicants, and arises in connection with treatment of samples having laminated layers including adjacent films of different materials of different ionization tendencies. Since the material to be subjected to the etching is a laminate, the material is subjected to quick corrosion due to an electrolytic corrosion between the adjacent films due to a battery action developing therebetween by different materials of different ionization tendencies. Particularly where laminated layers, as in the present claims, are processed, prior corrosion-proofing techniques have failed to provide sufficient corrosion-proofing effect, due to the quick and relatively large amount of electrolytic corrosion.

Against this background, Applicants provide a process which is adequate for corrosion proofing even of a laminate including at least two adjacent films of at least two different materials of different ionization tendencies, and even where a resist mask is used. Moreover, the present process can effectively be used to both provide corrosion resistance and remove a resist film used, for example, for patterning the laminate of the at least two adjacent films of at least two different metals of different ionization tendencies, overlying the substrate. Applicants have found that by utilizing, in combination after the plasma etch, a treatment in a second plasma both to remove the resist mask and remove residual corrosive compounds formed in the plasma etching, with the semiconductor sample being transferred from the etching location to the treatment in the second plasma through an atmosphere having an pressure reduced from atmospheric pressure, and then contacting the sample with a liquid (for example, water), the objectives according to the present invention are achieved; and, in particular, the laminate can be etched without corrosion thereof.

Furthermore, by performing drying after the liquid contact, in addition to the treatment in the second plasma and then liquid contact (to remove remaining residual corrosive compounds and/or to passivate the etched structure), further corrosion proofing can be achieved.

It is emphasized that the problem of corrosion is much greater when processing a semiconductor sample having a laminate comprising adjacent films of different materials of different ionization tendencies, due to, for example, the corrosion generated and accelerated due to battery action between films of the

laminate, including the adjacent films of different materials of different ionization tendencies. Notwithstanding this greater problem, which greater problem is unexpected from the references applied in the Office Action mailed February 14, 2002, the corrosion problem is unexpectedly avoided, and sufficient corrosion protection can be achieved, by processing according to the present invention. As to unexpectedly better results achieved according to the present invention, note the paragraph bridging pages 7 and 8 of Applicants' specification. Note also, for example, the Examples on pages 48-51 of Applicants' specification, particularly Fig. 8 and the description in connection therewith on pages 50 and 51 of Applicants' specification. It is respectfully submitted that this evidence in Applicants' specification shows unexpectedly better results in solving an unexpectedly severe problem, and further establishes unobviousness of the present invention. See In re DeBlauwe, 222 USPQ 191(CAFC 1991).

Elliot discloses various photo-fabrication processes for aluminum etching. This publication discloses a specific procedure including a CF_4 plasma to preclean a wafer and harden the resist; a CCl_4 plasma for aluminum etching; a H_2 plasma to remove chlorides from the parts and the chambers; and a CF_4:O_2 plasma to remove residual silicon precipitates. This publication then goes on to state that, after etching, occasionally a residue is left on the wafer, confirmed to be Al_2O_3 and SiO_2, and that this residue can be removed by partial dry etching followed by immersing in a wet-aluminum etch. Also described in this publication is that, after aluminum etching with positive photoresist, wafers should be stripped as soon as possible, because some free radicals may be absorbed and this will form hydrochloric acid

which will attack the aluminum.

As can be seen in the foregoing, and as indicated by the Examiner in the second paragraph of Item 4 on page 3 of the Office Action mailed February 14, 2002, Elliot is concerned with etching aluminum; moreover, this publication refers to an inorganic residue. It is respectfully submitted that the pertinent pages of this publication, as applied by the Examiner, would not have taught, nor would have suggested, etching of laminates having at least two adjacent layers respectively made of different materials from each other and having different ionization tendencies, whereby corrosion could be generated and accelerated by electrolytic corrosion due to battery action between films of the laminate, as presently claimed. More particularly, it is respectfully submitted that Elliot would not have taught, nor would have suggested, the particularly severe corrosion problem arising in connection with plasma etching laminates having adjacent films respectively made of different materials from each other and having different ionization tendencies, particularly where the etching is performed using a resist, or the solution to this problem as achieved by Applicants. Especially since Elliot discloses an inorganic residue, this reference would not have taught or suggested the more severe corrosion problem arising when using a resist.

In particular, it is respectfully submitted that, in Elliot, there is no disclosure, nor any suggestion, of an electrolytic corrosion problem arising in connection with etching of a laminate when adjacent layers of this laminate respectively are made of different materials from each other and have different ionization tendencies, particularly when a resist mask is used, as in the present claims, or the means for

solving this problem as achieved according to the present invention and discussed previously.

Moreover, it is respectfully submitted that Elliot does not disclose, nor would have suggested, treatment of material with a resist thereon, much less the more severe problems of corrosion arising in processing structure including the resist, and further including the laminate. Not having even disclosed the problem, it is respectfully submitted that Elliot, either alone or in combination with the teachings of the other applied references discussed infra, would not have taught or suggested the processing according to the present invention which avoids the severe problem of corrosion.

Nakamura discloses a method for stripping a photoresist coated on a layer of an aluminum alloy, formed on a semiconductor substrate. This patent document discloses that such stripping causes corrosion of the aluminum alloy, and describes various known procedures which attempted to prevent this corrosion but which are not successful when an aluminum alloy is etched. This patent document then goes on to describe a method for etching an aluminum alloy, which avoids the corrosion problem of the aluminum alloy. See, for example, page 3, lines 1-10 of Nakamura. Note also page 3, lines 42-46 of Nakamura, describing transfer of the substrate to a dry processing apparatus (for stripping the patterned photoresist) from the etching apparatus, through a vacuum system or an inert gas purged system to avoid exposure to the atmosphere, avoiding corrosion of the aluminum alloy.

It is emphasized that Nakamura discloses a technique for etching an aluminum alloy. It is respectfully submitted that the teachings of this reference,

either alone or in combination with the teachings of Elliot, would have neither taught nor would have suggested the method of etching the laminate with adjacent layers of different materials of different ionization tendencies, especially wherein the structure processed has a resist thereon. Again, it is emphasized that the combined teachings of these references would have neither disclosed nor would have suggested the particularly acute corrosion problem arising when etching laminates wherein adjacent layers are of different materials having different ionization tendencies, especially when such laminates have a resist film thereon, and a solution to this problem as achieved by the present invention.

Moe, et al. discloses a method for stripping photoresist from wafers, wherein the wafers are individually fed through a machine and are first soaked in stripping solution and then subjected to high pressure, high volume flow of stripping solution over the wafers in a closed environment. The wafers then pass into another housing and are rinsed with alcohol or water and then are passed to another housing where they are dried with heated air or nitrogen. See column 1, lines 28-35.

Initially, it is respectfully submitted that the teachings of Moe, et al., as applied by the Examiner, are not properly combinable with the teachings of Elliot and of Nakamura. In this regard, it is emphasized that Moe, et al. is concerned with a liquid method for stripping photoresist from wafers. The liquid which is the stripping solution is rinsed off. It is respectfully submitted that one of ordinary skill in the art concerned with dry etching and ashing using a plasma, would not have looked to the teachings of Moe, et al. In this regard, it is respectfully submitted that Moe, et al. is directed to a different technology (liquid stripping, as compared with dry ashing) and is concerned with a different problem (effective stripping using a liquid, in Moe, et al., as compared to dry etching and dry ashing procedures in Elliot, as applied by the

Examiner, and in Nakamura). In view of these differences in technology and problems addressed, it is respectfully submitted that Moe, et al. is not analogous art in connection with the other applied references; such that one of ordinary skill in the art concerned with in either of Elliot or Nakamura would not have looked to the teachings of Moe, et al.

In addition, it is respectfully submitted that the Examiner has pointed to no proper motivation for combining the teachings of Moe, et al. with the teachings of the other applied references.

Even assuming, arguendo, that the teachings of Moe, et al. were properly combinable with the teachings of Elliot and Nakamura, the combined teachings would have neither disclosed nor would have suggested the etching of the laminate having adjacent films of different materials having different ionization tendencies, much less having the resist on such laminate, or specific problems arising in connection therewith, which are avoided by the present invention, as discussed previously. Moreover, these references would have neither disclosed nor would have suggested, either alone or in combination, such method including wherein such laminate is made of the specific metals as in various of the present claims.

Peterman, et al. discloses a process for making metal contacts self-aligned to interconnecting metallurgy, the process including depositing a layer of polyimide over an insulating layer; depositing a layer of photoresist over the polyimide layer; photolithographically defining a wiring pattern in the layer of photoresist and transferring that pattern into the polyimide layer; depositing a second layer of photoresist; lithographically defining a pattern of contacts in the layer of resist and transferring that pattern into the insulating layer; and depositing a layer of metal which forms the contact studs and interconnect wiring. See column 1, line 56 to column 2, line 2. This patent discloses that the layer of metallurgy is "conformally

deposited", the metal layer being blanket etched to the surface of the polyimide layer in a reactive ion etcher. See column 3, lines 46-60. This patent further discloses that the interconnection metallurgy can be any material conventionally used for such purposes, including, but not limited to, aluminum, polysilicon, copper, silicon, titanium, tungsten, silver, gold or alloys or composites thereof. See column 3, lines 47-52.

It is respectfully submitted that Peterman, et al. discloses, e.g., a blanket etch of the interconnection wire. Moreover, at most, Peterman, et al. discloses that the interconnection wiring is a "composite". It is respectfully submitted that Peterman, et al., either alone or in combination with the teachings of the other references as applied by the Examiner, would have neither taught nor would have suggested etching of the laminate, as discussed previously, much less etching of the laminate of adjacent films of metals of different ionization tendencies. In addition, the blanket etch of Peterman, et al. would have taught away from use of the resist as in the present invention, and corrosion problems arising in connection with processing the specified laminate with a resist thereon, and wherein severe corrosion problems arise due to electrolytic corrosion, as discussed supra. Moreover, Peterman, et al., either alone or in combination with the other applied references, would have neither taught nor would have suggested etching of the laminate, of adjacent layers of metals of different ionization tendencies, in combination with use of the resist, with the second plasma treatment both removing the resist and removing corrosive compounds formed during the etching, with corrosive compounds remaining, and the liquid contact to remove remaining corrosive compounds and/or passivate the surface. In particular, it is respectfully submitted that Peterman, et al., either alone or in combination with the teachings of the other applied references, would have neither taught nor would have suggested the particularly acute problem of corrosion arising when etching the laminate with adjacent films of different materials of different ionization tendencies, which is even more severe in processing utilizing a

resist; or avoidance of such corrosion through use of the present method, as discussed previously.

Moreover, it is again emphasized that Peterman, et al. discloses a conformal deposition with blanket etch. It is respectfully submitted that the teachings of this reference, even in combination with the teachings of the other references as applied by the Examiner, would have taught away from etching a laminate as in the present claims, and using a resist mask, e.g., to pattern-etch the laminate, as in various of the present claims.

The contention by the Examiner that it would have been obvious to add transferral of the substrate being processed between different apparatuses under vacuum as taught by Nakamura, set forth on page 4 of the Office Action mailed February 14, 2002, is noted. It is again emphasized, however, that Nakamura is concerned with treatment of interconnection patterns of aluminum alloy. This patent document discloses that corrosion of the aluminum alloy is avoided by transferring the substrate (after etching) to a dry processing apparatus for stripping patterned photoresist, through a vacuum system or an inert gas purged system. Such disclosure in connection with avoiding corrosion of aluminum alloy would have neither disclosed nor would have suggested, either alone or in combination with the teachings of the other applied references, or would not have provided any motivation for, the transfer under reduced pressure of the processed structure including the laminate, according to the present invention.

The contention by the Examiner that it would have been obvious to have used the process disclosed by the combination of Elliot, Moe, et al. and Nakamura with

laminates with a reasonable expectation of success based upon their similar reactivity to the etch, set forth in the last paragraph on page 4 of the Office Action mailed February 14, 2002, is respectfully traversed. As seen in the foregoing, there is no "similar reactivity" with respect to corrosion of aluminum or aluminum alloy, on the one hand, and the laminate according to the present invention, on the other. Accordingly, it is respectfully submitted that the Examiner errs in connection with the "reasonable expectation of success based upon their similar reactivity".

The contention by the Examiner on page 5 of the Office Action mailed February 14, 2002, that "the mere addition of a resist mask can only have the obvious result of preventing etching of the covered areas", is noted. It is respectfully submitted, however, that the addition of the resist mask causes additional corrosion problems, as is clear from the foregoing. That is, additional products including corrosive compounds remain on the etched structure due to, for example, use of the resist mask. In view of the more serious and acute corrosion problems arising in using the resist mask, particularly in combination with the laminate, it is respectfully submitted that the Examiner clearly errs in his conclusion as to the "mere addition of a resist mask can only have the obvious result of preventing etching of the covered areas".

The contention by the Examiner in the last paragraph on page 5 of the Office Action mailed February 14, 2002, is noted. Such contention is moot in light of present amendments independent claims 8 and 27, such that these claims recite that the sample is transferred from the first location to the second location through an atmosphere having a pressure reduced from atmospheric pressure.

It is respectfully submitted that the additional teachings of Noguchi, et al., as applied in Item 5 on page 6 of the Office Action mailed February 14, 2002, would not have rectified the deficiencies of the other applied references, Elliot, Nakamura, Moe, et al. and Peterman, et al., such that the presently claimed invention as a whole would have been obvious to one of ordinary skill in the art.

Noguchi, et al. discloses a dry-etching apparatus which can etch aluminum wiring films on wafers of integrated circuit elements, and can provide a post-treatment in which etching resist films are removed together with the chlorides deposited on the surface of the wafers during the etching process. The dry-etching apparatus is provided with a post-treatment chamber in a vacuum antechamber attached to an etching chamber, so that the wafers recovered from the etching chamber can be removed into the atmosphere via the post-treatment chamber. See column 1, lines 6-10 and column 2, lines 7-12. See also column 2, lines 33-43 and column 8, lines 17-29. Note also column 9, line 66 to column 10, line 5.

It is noted that Noguchi, et al. is concerned with apparatus for etching an aluminum wiring film. Noguchi, et al., even in combination with the teachings of the other applied references, would have neither taught nor would have suggested the presently claimed subject matter, including processing of the semiconductor sample having a laminate of adjacent layers respectively being made of different materials from each other and having different ionization tendencies, or the more acute problem of corrosion due to electrolytic corrosion by battery action between films of the laminate, and avoiding such corrosion of the etched laminate structure by, inter alia, transferring the sample between first and second locations through an

atmosphere having pressure reduced from atmospheric pressure, in combination with treatment with the second plasma to remove residual corrosive compounds and remove the resist mask, and thereafter contacting the etched and second-plasma-treated sample with at least one liquid, to remove remaining residual corrosive compounds and/or passivate the surface.

The contention by the Examiner in the third paragraph of Item 5, on page 6 of the Office Action mailed February 14, 2002, is noted. It is respectfully submitted that the Examiner has not set forth a proper motivation for combining the teachings of the applied references. In view of the extra added costs and apparatus necessary for transfer in a reduced atmosphere, it is respectfully submitted that there would need to be some motivation to use such additional equipment, and not merely "a reasonable expectation of achieving the desired transfer between the etched chambers without air/atmospheric contact".

Applicants respectfully traverse the obviousness-type double patenting rejections as set forth in Item 6 and 7 on pages 6 and 7 of the Office Action mailed February 14, 2002, particularly in view of the following.

In this regard, reference to "U.S. Patent No. 6,007,788, in Item 7 on page 7 of the Office Action mailed February 14, 2002", is noted. It is respectfully submitted that "6,007,788" is apparently an incorrect number, this patent being a patent of Bellon, et al., assigned to DiverseyLever, Inc., and directed to an injection molded container for detergents. A first page of this U.S. patent is enclosed herewith. Clearly, an obviousness-type double patenting rejection over the subject matter claimed in Bellon, et al. is improper.

In the Form PTO-892 enclosed with the Office Action mailed February 14, 2002, the Examiner lists U.S. Patent No. 6,007,788, dated June 2000, in the name of Kawasaki, et al. It is respectfully submitted, however, that U.S. Patent No. 6,077,788 is dated June 20, 2000 and is to Kawasaki, et al. If the obviousness-type double patenting rejection in Item 7 on page 7 of the Office Action mailed February 14, 2002 is over U.S. Patent No. 6,077,788, it is respectfully requested that the Examiner clarify and correct the record both with respect to the obviousness-type double patenting rejection and with respect to the patent listed in the aforementioned Form PTO-892.

In any event, it is respectfully submitted that the subject matter claimed in U.S. Patent No. 5,007,981 and U.S. Patent No. 6,077,788 would have neither taught nor would have suggested the presently claimed subject matter, including, inter alia, the transfer between the etching of the semiconductor sample and the treatment by the second plasma, through an atmosphere having a pressure reduced from atmospheric pressure, and advantages achieved thereby.

In Item 6 on page 6 of the Office Action mailed February 14, 2002, the Examiner focuses on the use of the mask. However, in addition to use of the mask, it is respectfully submitted that U.S. Patent No. 5,007,981 would have neither taught nor would have suggested the transfer between the first and second locations (respectively where the etching and second plasma treatment are performed) through an atmosphere having a pressure reduced from atmospheric pressure. Especially in view of this additional difference, and particularly in view of advantages achieved thereby, including further avoidance of corrosion, it is respectfully

submitted that the obviousness-type double patenting rejection is improper.

Furthermore, it is again emphasized that due to use of the resist mask, according to the present invention, more acute problems of corrosion occur, as discussed previously. Accordingly, Applicants traverse the conclusion by the Examiner that the present claims merely include use of resist masks; rather, the present invention utilizes resist masks and addresses problems arising in connection with processes using such mask, and overcomes such problems, thereby providing a basis for patentability over the subject matter claimed in, for example, U.S. Patent No. 5,007,981.

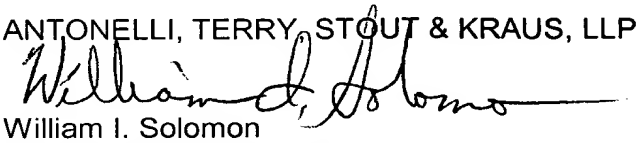
In view of the foregoing comments and amendments, reconsideration and allowance of all claims remaining in the application are respectfully requested.

Attached hereto is a marked-up version of the changes made to the claims by the current Amendment. This marked-up version is on the attached pages, the first page of which is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Deposit Account No. 01-2135 (Case No. 503.28546CV9) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



William I. Solomon
Registration No. 28,565

1300 North Seventeenth Street
Suite 1800
Arlington, VA 22209
Tel.: 703-312-6600
Fax.: 703-312-6666

WIS/slk

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Please cancel claims 1-7, 18-26 and 28-65 without prejudice or disclaimer, and amend the claims remaining in the application as follows:

8. (Twice Amended) A method of processing a semiconductor sample having a laminate comprising at least two adjacent films of at least two different metals of different ionization tendencies overlying a semiconductor substrate, whereby corrosion could be generated and accelerated due to battery action between films of the laminate, including said at least two adjacent films, comprising the steps of:

(i) etching said semiconductor sample, including said at least two adjacent films, using a resist mask, by means of a first plasma formed in a first gas with first processing conditions, residual corrosive compounds being left on the sample after the etching,

(ii) after step (i), ashing the sample by means of a second plasma to remove at least the resist mask and said residual corrosive compounds formed in step (i), said second plasma being formed in a second gas and with second processing conditions, said ashing being carried out at a second location different from a first location where said etching is carried out, [said first and second locations being capable of being in communication with each other] and wherein the semiconductor sample having the laminate is transferred from said first location to said second location through an atmosphere having a pressure reduced from atmospheric pressure,

(iii) contacting a surface of said sample etched in step (i) and ashed in step (ii) with at least one liquid which effects at least one of (a) removal of said residual corrosive compounds formed in step (i) which were not removed in step (ii) and (b) passivation of said surface etched in step (i) and ashed in step (ii), and

(iv) after step (iii), drying the sample.

27. (Twice Amended) A method of processing a semiconductor sample having a laminate of at least two adjacent layers overlying a semiconductor substrate and a resist mask formed on said laminate, said at least two adjacent layers respectively being made of different materials from each other and having different ionization tendencies from each other, whereby corrosion could be generated and accelerated due to battery action between layers of the laminate, including said at least two adjacent layers, comprising the steps of:

(i) etching each of said at least two layers of said laminate through said resist mask, by means of a first plasma, so as to form an etched sample having an etched shape which corresponds to a pattern of said resist mask, residual corrosive compounds from the etching being left on the etched sample;

(ii) after step (i), treating the etched sample by means of a second plasma, to remove said residual corrosive compounds formed in step (i) and to remove said resist mask, said treating being carried out at a second location different from a first location where said etching is carried out, [said first and second locations being capable of being in communication with each other] and wherein the semiconductor sample having the laminate is transferred from said first location to said second location through an atmosphere having a pressure reduced from

atmospheric pressure;

(iii) contacting a surface of said semiconductor sample etched in step (i) and treated in step (ii) with at least one liquid, to remove said residual corrosive compounds which were not removed in step (ii); and

(iv) after step (iii), drying the semiconductor sample.

11/7/2007

ANTONELLI, TERRY, STOUT & KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON VA 22209

503.28546vp4
NOA** 3/28

EXAMINER	
ANGEBRANNDT, M	
ART UNIT	PAPER NUMBER
1113	

DATE MAILED: 03/07/02

Below is a communication from the EXAMINER in charge of this application

COMMISSIONER OF PATENTS AND TRADEMARKS

RECEIVED
JUL 18 2002
TC 1700

OIPE JC34
JUL 15 2002
PATENT & TRADEMARK OFFICE

ADVISORY ACTION

W/S

☒ THE PERIOD FOR RESPONSE:

a) ☒ is extended to run 4 months or continues to run ____ from the date of the final rejection

b) ☐ expires three months from the date of the final rejection or as of the mailing date of this Advisory Action, whichever is later. In no event however, will the statutory period for the response expire later than six months from the date of the final rejection.

Any extension of time must be obtained by filing a petition under 37 CFR 1.136(a), the proposed response and the appropriate fee. The date on which the response, the petition , and the fee have been filed is the date of the response and also the date for the purposes of determining the period of extension and the corresponding amount of the fee. Any extension fee pursuant to 37 CFR 1.17 will be calculated from the date of the originally set shortened statutory period for response or as set forth in b) above.

☐ Appellant's Brief is due in accordance with 37 CFR 1.192(a).

☒ Applicant's response to the final rejection, filed 2/26/02 has been considered with the following effect, but it is not deemed to place the application in condition for allowance:

1. ☐ The proposed amendments to the claim and /or specification will not be entered and the final rejection stands because:

   a. ☐ There is no convincing showing under 37 CFR 1.116(b) why the proposed amendment is necessary and was not earlier presented.

   b. ☐ They raise new issues that would require further consideration and/or search. (See Note).

   c. ☐ They raise the issue of new matter. (See Note).

   d. ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal.

   e. ☐ They present additional claims without cancelling a corresponding number of finally rejected claims.

   NOTE: _____

2. ☐ Newly proposed or amended claims _____ would be allowed if submitted in a separately filed amendment cancelling the non-allowable claims.

3. ☒ Upon the filing an appeal, the proposed amendment ☒ will be entered ☐ will not be entered and the status of the claims will be as follows:

   Claims allowed: None
   Claims objected to: None
   Claims rejected: 1-20

   However;

   ☒ Applicant's response has overcome the following rejection(s): 1

4. ☒ The affidavit, exhibit or request for reconsideration has been considered but does not overcome the rejection because 1

5. ☐ The affidavit or exhibit will not be considered because applicant has not shown good and sufficent reasons why it was not earlier presented.

☐ The proposed drawing correction ☐ has ☐ has not been approved by the examiner.

ther 1700

MARTIN ANGEBRANNDT
PRIMARY EXAMINER
GROUP 1100

OL-303 (REV. 5-89)

ART UNIT	PAPER NUMBER

DATE MAILED:

Below is a communication from the EXAMINER in charge of this application

COMMISSIONER OF PATENTS AND TRADEMARKS

ADVISORY ACTION

☒ THE PERIOD FOR RESPONSE:

a) ☒ is extended to run 4 months or continues to run ——— from the date of the final rejection

b) ☐ expires three months from the date of the final rejection or as of the mailing date of this Advisory Action, whichever is later. In no event however, will the statutory period for the response expire later than six months from the date of the final rejection.

Any extension of time must be obtained by filing a petition under 37 CFR 1.136(a), the proposed response and the appropriate fee. The date on which the response, the petition , and the fee have been filed is the date of the response and also the date for the purposes of determining the period of extension and the corresponding amount of the fee. Any extension fee pursuant to 37 CFR 1.17 will be calculated from the date of the originally set shortened statutory period for response or as set forth in b) above.

☐ Appellant's Brief is due in accordance with 37 CFR 1.192(a).

☒ Applicant's response to the final rejection, filed 2/5/97 & 2/11/97 has been considered with the following effect, but it is not deemed to place the application in condition for allowance.

1. ☐ The proposed amendments to the claim and /or specification will not be entered and the final rejection stands because:

   a. ☐ There is no convincing showing under 37 CFR 1.116(b) why the proposed amendment is necessary and was not earlier presented.

   b. ☐ They raise new issues that would require further consideration and/or search. (See Note).

   c. ☐ They raise the issue of new matter. (See Note).

   d. ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal.

   e. ☐ They present additional claims without cancelling a corresponding number of finally rejected claims.

   NOTE: _____

2. ☐ Newly proposed or amended claims _____ would be allowed if submitted in a separately filed amendment cancelling the non-allowable claims.

3. ☒ Upon the filing an appeal, the proposed amendment ☒ will be entered ☐ will not be entered and the status of the claims will be as follows:

   Claims allowed: None

   Claims objected to: None

   Claims rejected: 35, 40-43, 47, 48-52-57

   However;

   ☒ Applicant's response has overcome the following rejection(s): those over Elliot alone & those made under 112

4. ☒ The ~~affidavit, exhibit or~~ request for reconsideration has been considered but does not overcome the rejection because the teaching enhance laminate. Note Schueller case cite.

5. ☐ The affidavit or exhibit will not be considered because applicant has not shown good and sufficent reasons why it was not earlier presented.

☐ The proposed drawing correction ☐ has ☐ has not been approved by the examiner.

☒ Other PTO-1449

Note: Change of inventorship has granted & no new declaration need be filed. 516 of office Action & IDS filed after final

MARTIN ANGEBRANNDT
PRIMARY EXAMINER
GROUP 1100

PTOL-303 (REV. 5-89)

☆ U.S. GOVERNMENT PRINTING OFFICE: 1989-239-875

US006007788A

United States Patent [19]

Bellon et al.

[11] **Patent Number: 6,007,788**

[45] **Date of Patent: Dec. 28, 1999**

[54] **INJECTION MOLDED CONTAINER FOR DETERGENTS**

[75] Inventors: **Tiziano Joseph Bellon**, Northville, Mich.; **James Wesley Livingston**, Santa Cruz, Calif.; **Patricia Anne Anderson**, Mason, Ohio; **Donald Wright**, Mississauga, Canada; **Charles Alan Messamer**, San Jose; **Clifford Francis Mc Namara**, Capitola, both of Calif.

[73] Assignee: **DiverseyLever, Inc.**, Plymouth, Mich.

[21] Appl. No.: **08/953,617**

[22] Filed: **Oct. 17, 1997**

[51] **Int. Cl.**[6] **B01D 11/02**

[52] **U.S. Cl.** ..... **422/264**; 422/266; 422/279; 68/17 R

[58] **Field of Search** ..... 422/264, 266, 422/278, 279; 137/268; 68/17 R

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,738,323	3/1956	Tepas	422/274
3,383,178	5/1968	Dietz	422/278
3,416,897	12/1968	Long et al.	422/264
3,595,438	7/1971	Daley et al.	422/274 X
4,199,001	4/1980	Kratz	422/264 X
4,250,911	2/1981	Kratz	422/264 X
4,462,511	7/1984	Fulmer	422/261 X
4,666,782	5/1987	Mayer et al.	428/423.9
4,790,981	12/1988	Mayer	422/263
4,928,240	5/1990	Lakhan	701/100
4,964,185	10/1990	Lehn	8/158
5,007,559	4/1991	Young	422/266 X
5,076,315	12/1991	King	422/264 X
5,078,301	1/1992	Gladfelter	222/52
5,086,952	2/1992	Kryk	422/264
5,147,615	9/1992	Bird	422/261
5,229,084	7/1993	Livingston	422/278
5,234,615	8/1993	Gladfelter	510/439
5,251,656	10/1993	Sexton	422/264 X
5,262,132	11/1993	Bricker	422/263
5,759,501	6/1998	Livingston et al.	422/266 X

FOREIGN PATENT DOCUMENTS

44 14 956	of 0000	Germany .
96/41565	of 0000	WIPO .

Primary Examiner—Elizabeth McKane

[57] **ABSTRACT**

A container for dispensing detergent for an automatic washing apparatus includes a straight, inwardly tapered side wall which has an open top and a bottom portion. The bottom portion includes an integral screen which includes a water inlet. Detergent is placed in the container and snap-on covers are positioned over the top and bottom of the container. To dispense detergent from the container, the bottom cover is removed and the container placed in a dispensing unit which sprays water through the bottom. Dissolved detergent is collected and flows to the washing apparatus. The container is easy to manufacture, easy to fill, easy to ship and use.

10 Claims, 4 Drawing Sheets